

ENHANCED N_2^+ IN THE SHUTTLE ENVIRONMENT

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Abstract

Observations were made of the N_2^+ first negative and Meinel emission bands with the Imaging Spectrometric Observatory (ISO) on Spacelab 1. These observations have revealed the presence of N_2^+ emissions which exceed those expected on the basis of current ionospheric models by up to a factor of 10. If the emission is of terrestrial origin, large unidentified ionospheric sources of N_2^+ ions must exist. On the other hand, if the source is local to the shuttle environment, a mechanism must be found which is capable of generating emissions of such unexpectedly large intensity. We suggest charge exchange of ambient ionospheric O^+ ions with shuttle environmental N_2 , followed by resonance scattering of sunlight, as a candidate. However, this model implies that a cloud of N_2 gases must surround the vehicle in concentrations in excess of 10^{11} cm^{-3} with a scale length of tens of meters. In addition, the N_2^+ residence time must be of the order of 10 sec.